

# The Authority's draft determination of causer

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2 May 2021 under-frequency event  
Consultation paper

Submissions close: 5pm, 24 August 2021

27 July 2021



## Executive summary

### **An under-frequency event occurred on 2 May 2021**

The normal frequency band in New Zealand is between 49.8 and 50.2 Hz. An under-frequency event (UFE) occurs when the frequency falls below 49.25 Hz because of a loss of more than 60 MW injected into the grid. The Electricity Industry Participation Code 2010 (Code) requires us to determine the causer (as defined in the Code) of a UFE and sets the process for making the determination (clause 8.61).

The purpose of this paper is to:

- (a) set out our draft determination of the causer for the 2 May 2021 UFE
- (b) consult with interested parties on the draft determinations.

### **Our draft determination is that Genesis is the causer for the 2 May 2021 UFE**

Our draft determination under clause 8.61 of the Code is that Genesis Energy Limited (Genesis), as a generator, was the causer of the UFE on 2 May 2021.

The reasons for the draft determination are:

- (a) the interruption/reduction of energy occurred at Unit 5 at the Huntly power station, which belongs to Genesis
- (b) no other asset was identified as having caused or potentially caused the UFE
- (c) in the system operator's view, Genesis is the causer of the UFE
- (d) in reply to a system operator letter, Genesis has accepted that it was the causer.

### **Submissions are invited from interested parties**

We must consult with interested parties before making a final determination. Interested parties are invited to make a submission on the Authority's draft determination by 5 pm on 24 August 2021. We will consider all submissions received and make a final determination on each UFE.

We also invite comment on the system operator's calculations of the megawatts (MW) lost during the events, which the system operator uses for calculating the UFE charge.

# Contents

Executive summary	ii
An under-frequency event occurred on 2 May 2021	ii
Our draft determination is that Genesis is the causer for the 2 May 2021 UFE	ii
Submissions are invited from interested parties	ii
1 What you need to know to make a submission	1
What this consultation paper is about	1
How to make a submission	1
When to make a submission	1
2 Introduction	2
3 The 2 May 2021 UFE draft determination	2
Genesis was the causer of the 2 May 2021 UFE	2
The system operator investigated the causer of the UFE	2
We considered the circumstances of the UFE	2
4 We will consider submissions and make a final determination	3
5 The system operator has calculated the MW lost during the event based on its investigations	3
Appendix A Format for submissions	4
Appendix B Causation report 2 May 2021 under-frequency event	5

# 1 What you need to know to make a submission

## What this consultation paper is about

- 1.1 The purpose of this paper is to consult with interested parties on the Authority's draft determination that Genesis Energy Limited, as the generator that owns Huntly Unit 5, was the causer of the UFE on 2 May 2021 at 07:36 hours.

## How to make a submission

- 1.2 Our preference is to receive submissions in electronic format (Microsoft Word) in the format shown in Appendix A. Submissions in electronic form should be emailed to [UFEconsultations@ea.govt.nz](mailto:UFEconsultations@ea.govt.nz) with "Consultation Paper—2 May 2021 under-frequency event" in the subject line.
- 1.3 If you cannot send your submission electronically, post one hard copy to either of the addresses below, or fax it to 04 460 8879.

### Postal address

Submissions  
Electricity Authority  
PO Box 10041  
Wellington 6143

### Physical address

Submissions  
Electricity Authority  
Level 7, Harbour Tower  
2 Hunter Street  
Wellington

- 1.4 Please note we want to publish all submissions we receive. If you consider that we should not publish any part of your submission, please
- (a) indicate which part should not be published
  - (b) explain why you consider we should not publish that part
  - (c) provide a version of your submission that we can publish (if we agree not to publish your full submission).
- 1.5 If you indicate there is part of your submission that should not be published, we will discuss with you before deciding whether to not publish that part of your submission.
- 1.6 However, please note that all submissions we receive, including any parts that we do not publish, can be requested under the Official Information Act 1982. This means we would be required to release material that we did not publish unless good reason existed under the Official Information Act to withhold it. We would normally consult with you before releasing any material that you said should not be published.

## When to make a submission

- 1.7 Please deliver your submissions by **5pm** on Tuesday **24 August 2021**.
- 1.8 We will acknowledge receipt of all submissions electronically. Please contact the Authority [info@ea.govt.nz](mailto:info@ea.govt.nz) or 04 460 8860 if you don't receive electronic acknowledgement of your submission within two business days.

## 2 Introduction

- 2.1 Clause 8.60 of the Code requires the system operator to investigate the causer of a UFE and provide a report to us.
- 2.2 Clause 8.61(2) requires us to publish a draft determination that states whether a UFE was caused by a generator or grid owner, and, if so, the identity of the causer. Clause 8.61(3) requires us to give reasons for our findings in the draft determination.

## 3 The 2 May 2021 UFE draft determination

### **Genesis was the causer of the 2 May 2021 UFE**

- 3.1 Our draft determination under clause 8.61 is that Genesis, as the generator that owns Huntly Unit 5, was the causer of the UFE on 2 May 2021 at 07:36 hours.

### **The system operator investigated the causer of the UFE**

- 3.2 The system operator's report (dated June 2021) is attached as Appendix B.
- 3.3 The circumstances described in the report are summarised below:
  - (a) At 07:36 Huntly Unit 5 tripped removing 271 MW of generation, the frequency fell to 49.15 Hz in the North Island and 49.18 Hz in the South Island.
  - (b) The frequency fall and the quantum of MW lost (greater than the 60 MW minimum) meant that a UFE, as defined in Part 1 of the Code, had occurred.
  - (c) Interruptible load and instantaneous reserves in the North Island responded, returning the frequency to the normal band.
  - (d) Huntly Unit 5 tripped on a combustor bypass valve deviation. Investigation into the tripping and other system events supports Genesis's position that the trip of Huntly Unit 5 caused the UFE. Genesis confirmed that following the trip, the issue at Huntly Unit 5 was identified, repaired and fully resolved.
  - (e) No other event or asset operation was identified as occurring at or around the time of the UFE.
  - (f) On 24 May 2021, the system operator wrote to Genesis setting out its view that Huntly Unit 5 tripped resulting in a loss of injection and requesting any information Genesis could provide. On 28 May 2021, Genesis agreed it was the causer.
  - (g) On 24 May 2021, the system operator requested the grid owner provide information on the circumstances of the UFE. On 26 May 2021, the grid owner provided some supporting information. The grid owner didn't believe it was the causer.

### **We considered the circumstances of the UFE**

- 3.4 We have considered the system operator's report and correspondence with Genesis and the grid owner. Our reasons for the draft determination that Genesis is the causer are:
  - (a) a UFE occurred on 2 May 2021 at 07:36 hours when frequency dropped to 49.15 Hz in the North Island and 49.18 Hz in the South Island
  - (b) the interruption/reduction of electricity occurred at the grid injection point for Huntly Unit 5, which belongs to Genesis
  - (c) no other asset was identified as having caused or potentially caused the UFE

- (d) the system operator and Genesis agree that Genesis was the causer of the UFE.
- 3.5 Having considered the relevant elements of the Code, we (based on the information available to us at this time) agree with the system operator's findings on the 2 May 2021 UFE.

**Q1. Do you agree with the draft determination that Genesis Energy Limited is the causer of the under-frequency event on 2 May 2021 at 07:36 hours? If not, please advise your view on the causer and give reasons.**

## 4 We will consider submissions and make a final determination

- 4.1 Clause 8.61(4) of the Code requires us to consult every generator, grid owner and other participant substantially affected by a UFE in relation to a draft determination. We have allowed a consultation period of five weeks for this draft determination.
- 4.2 Accordingly, the deadline for submissions is 5 pm on 24 August 2021.
- 4.3 We will consider submissions received and publish the Authority's final determination. Clauses 8.62 and 8.63 of the Code set out provisions relating to any disputes regarding our determination.

## 5 The system operator has calculated the MW lost during the event based on its investigations

- 5.1 The Code sets out how to calculate the event charge payable by the causer of a UFE. This in turn enables calculation of the rebates paid for UFEs (clauses 8.64 and 8.65 of the Code).
- 5.2 Central to the event charge calculation is determining the MW of injection lost at one or more grid injection points as a result of the UFE. The system operator determines the MW lost as part of its investigations into a UFE.
- 5.3 The system operator followed its procedure *PR-RR-017 Calculating the Amount of MW lost* to determine the MW value (provided to the clearing manager for calculating UFE charges).
- 5.4 The system operator has determined the loss of injection into the grid. The 2 May 2021 event was 271 MW at the grid injection point for Huntly Unit 5, resulting in an event charge of \$263,750.
- 5.5 The system operator's calculation of the MW lost is included in its report. The calculation doesn't form part of the Authority's draft determination. However, we acknowledge that the calculation is central to determining the UFE charge payable by the causer, and therefore also to the rebate paid for a UFE. Accordingly, we invite comment on the system operator's calculation of the MW lost.

**Q2. Do you agree with the system operator's calculation that 271 MW was lost from the power system as a result of the 2 May 2021 UFE? If not, please advise your view on the MW lost and give reasons.**

## Appendix A Format for submissions

Submitter	
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Question	Comment
<p>Q1. Do you agree with the draft determination that Genesis Energy Limited is the causer of the under-frequency event on 2 May 2021 at 07:36 hours? If not, please advise your view on the causer and give reasons.</p>	
<p>Q2. Do you agree with the system operator's calculation that 271 MW was lost from the power system as a result of the 2 May 2021 UFE? If not, please advise your view on the MW lost and give reasons.</p>	

## Appendix B Causation report 2 May 2021 under-frequency event



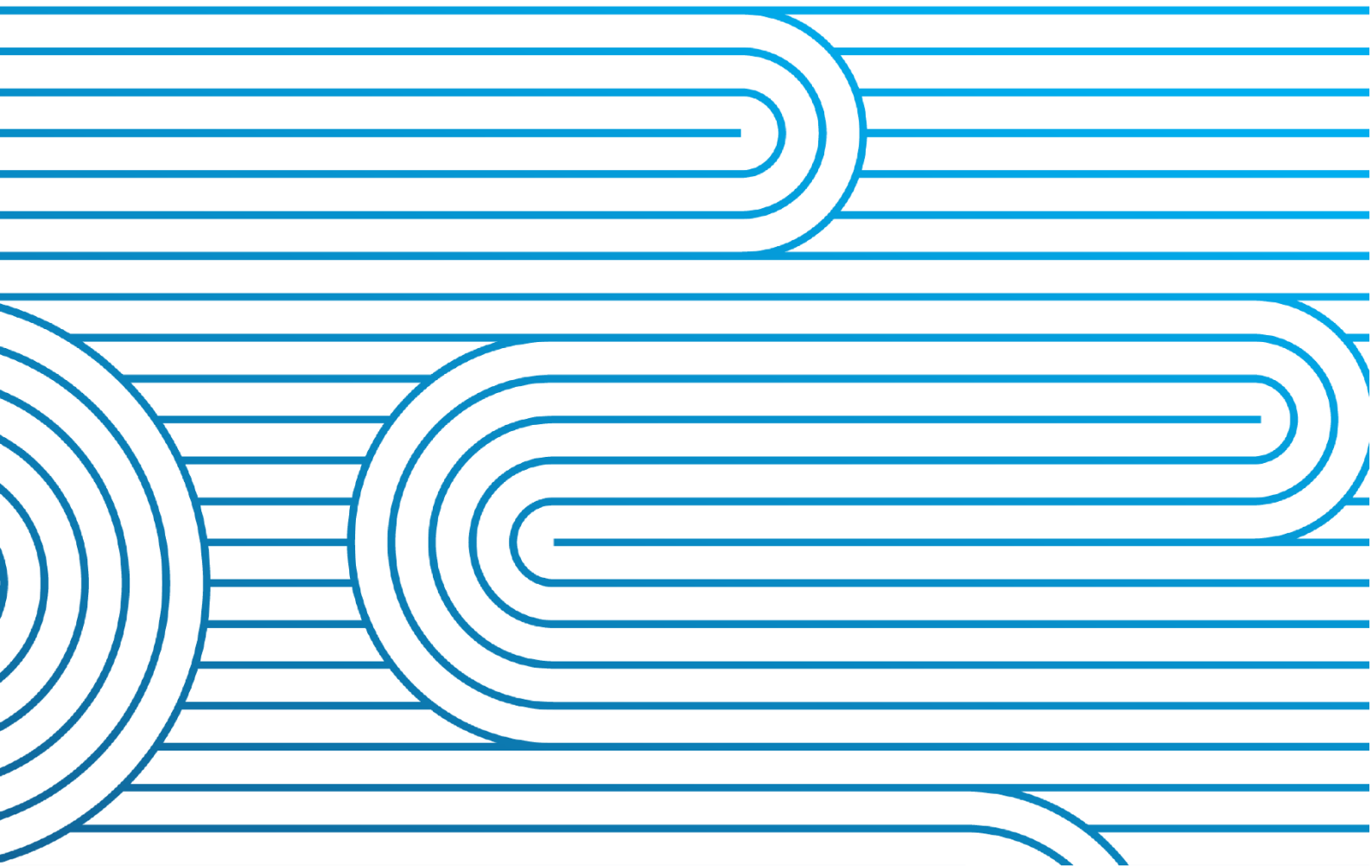
# **Causation Report**

## **2 May 2021**

### **Under-Frequency Event**

System operator event 4175

**June 2021**



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## IMPORTANT

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Purpose ..... 4

Executive summary ..... 5

System events – 2 May 2021 ..... 6

    Prior to the under-frequency event ..... 6

    The under-frequency event ..... 6

    After the under-frequency event ..... 6

Rational for recommendation ..... 8

    Factors considered..... 8

Calculation of MW Lost..... 9

Appendix 1: Correspondence ..... 10

    1.1 Confirmation of event notice ..... 10

    1.2 System Operator request for information – Genesis Energy ..... 10

    1.3 System Operator request from information – Grid Owner..... 11

    1.4 Genesis Energy response ..... 13

    1.5 Grid Owner response ..... 14

Appendix 2: Charts ..... 15

    System Frequency and MW Trace 2 May 2021..... 15



## PURPOSE

On 2 May 2021 a reduction of energy into the power system caused the system frequency in the North Island to fall below 49.25 Hz, resulting in an under-frequency event.

Pursuant to clause 8.60 of the Electricity Industry Participation Code (**Code**), the system operator investigated the event to assist the Electricity Authority (**Authority**) in determining a causer of the under-frequency event.

4

This Causation Report is provided to the Authority pursuant to clause 8.60(5) of the Code and includes the following:

- The system operator's recommendation of the causer of the under-frequency event.
- The system operator's reasons for forming its view.
- The information considered in reaching this view.

## EXECUTIVE SUMMARY

At 07:36:08 on 2 May 2021 Genesis Energy's Huntly Station Unit 5 generator (**Huntly Unit 5**) tripped.

The disconnection of generation from Huntly Unit 5 removed 271 MW of injection into the power system.

At 07:36:09 the North Island frequency fell to 49.15 Hz, and the South Island frequency fell to 49.18 Hz.

Each of the North Island and South Island frequencies falling below 49.25 Hz constitutes an under-frequency event, as defined in the Code.

Genesis Energy has stated that it believes the tripping of Huntly Unit 5 was the cause of the under-frequency on 2 May 2020.

Investigation into the tripping and other system events supports Genesis's position that the trip of Huntly Unit 5 caused the under-frequency event.

Accordingly, the system operator recommends Genesis Energy be found as the causer of the under-frequency event on 2 May 2020.

## SYSTEM EVENTS – 2 MAY 2021

### Prior to the under-frequency event

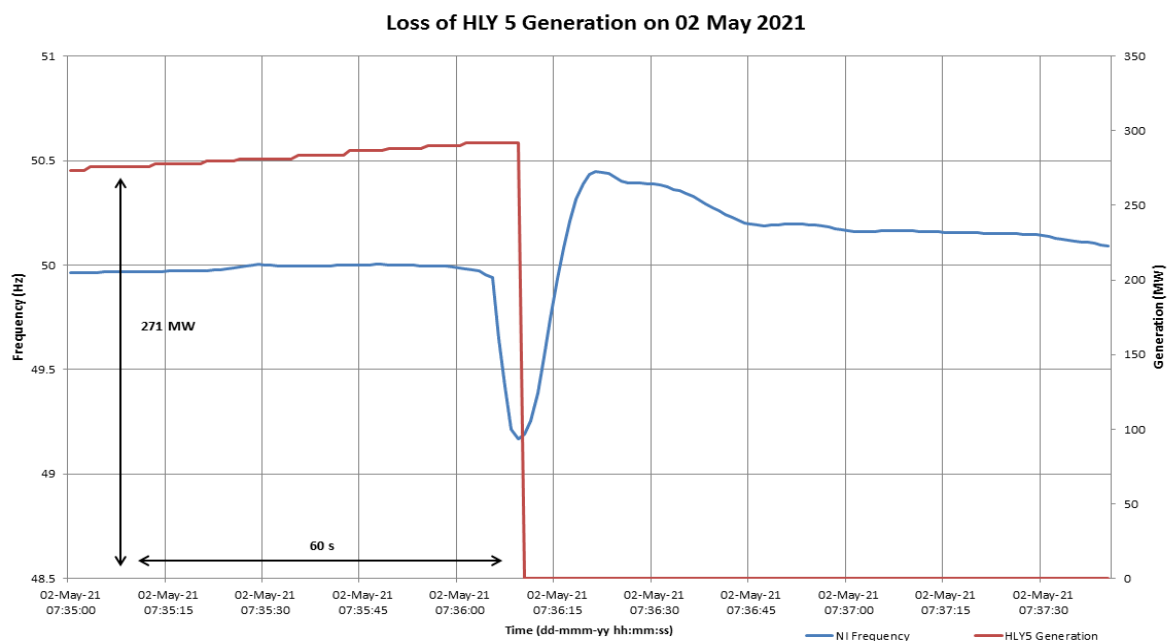
According to the grid owner, there were no protection operations on any grid assets in the vicinity of Huntly either before or after Huntly Unit 5 tripped that may have contributed to the frequency falling below 49.25 Hz.

### The under-frequency event

6

According to Genesis, Huntly Unit 5 tripped on a combustor bypass valve deviation.

At 07:36:08 the disconnection of Huntly Unit 5 removed 271 MW of generation injection into the power system and, as a consequence, reduced the system frequency at 07:36:09 to 49.15 Hz in the North Island and 49.18 Hz in the South Island.



### After the under-frequency event

At the time of the event, the system operator had dispatched:

- North Island instantaneous reserve providers to be available to provide 106.29 MW FIR and 197.21 MW SIR;
- South Island instantaneous reserve providers to be available to provide 97.1 MW FIR and 107.62 MW SIR; and
- North Island interruptible load providers to be available to trip 76.28 MW FIR and 110.53 MW SIR.

These reserve providers responded, returning the frequency to the normal band within 4 seconds.

The grid owner confirmed its PI data shows that the HVDC temporarily increased transfer to support the North Island AC system after Huntly Unit 5 tripped. No other event or asset operation was identified as occurring at or around the time of the under-frequency event.

Genesis confirmed that following the trip, the issue at Huntly Unit 5 was identified, repaired and fully resolved.

## RATIONAL FOR RECOMMENDATION

### Factors considered

Only one event occurred in close proximity to the North Island and South Island frequencies falling below 49.25 Hz, namely the tripping of Huntly Unit 5 at 07:36:08.

Accordingly, assessment of this information confirms that only the tripping of Huntly Unit 5 can be linked with the North Island and South Island frequencies falling below 49.25Hz.

8

Genesis Energy and the grid owner were both asked if they considered themselves the causer of the under-frequency event.

Genesis Energy confirmed that the tripping of Huntly Unit 5 caused the under-frequency event.

The grid owner does not believe it caused the under-frequency event.



## CALCULATION OF MW LOST

The purpose of this calculation is to determine the MW value provided to the clearing manager for the purposes of calculating the under-frequency event charge.

The system operator follows the procedure 'Calculating the Amount of MW lost' (PR-RR-017) to determine the MW lost. This procedure follows the formula set out in clause 8.64 of the Code for calculating an event charge.

The event charge payable by the causer of an under-frequency event (referred to as "Event e" below) must be calculated in accordance with the following formula:

$$EC = ECR * (\sum y (INTye \text{ for all } y) - INJd)$$

where

EC is the event charge payable by the causer

ECR is \$1,250 per MW

INJd is 60 MW

INTye is the electric power (expressed in MW) lost at point y by reason of Event e (being the net reduction in the injection of electricity (expressed in MW) experienced at point Y by reason of Event e) excluding any loss at point y by reason of secondary Event e

y is a point of connection or the HVDC injection point at which the injection of electricity was interrupted or reduced by reason Event e

As the ECR and INJd values are constants the values to calculate and complete the formula are y and INTye.

To establish the amount of MW lost, SCADA data was extracted for the 60 seconds prior to the frequency (both North and South Islands) reaching 49.25 Hz for generation into the Huntly grid injection point.

After evaluation, the amount of MW lost causing the frequency (both North and South Islands) to fall below 49.25 Hz was determined to be 271 MW.

Using the event charge formula the calculation is as follows:

$$\text{Event Charge} = \$1250 * (271\text{MW} - 60\text{MW})$$

$$\text{Event Charge} = \$263,750$$

**Genesis Energy confirmed the calculation of MW lost in its response to the system operator dated 28 May 2021 (see Appendix 1.4).<sup>1</sup>**

<sup>1</sup> Note in the system operator's letter to Genesis dated 24 May 2021 (see Appendix 1.2), we incorrectly calculated the amount of MW lost. We have verified Genesis' calculation and can confirm it is correct.

# Appendix 1: CORRESPONDENCE

## 1.1 CONFIRMATION OF EVENT NOTICE

10



### Customer Advice Notice

**To:** CAN NZ Participants **From:** The System Operator  
**Sent:** 04-may-2021 15:33 **Telephone:** 0800 488 500  
**Ref:** 3905519179 **Email:** NMDData@transpower.co.nz

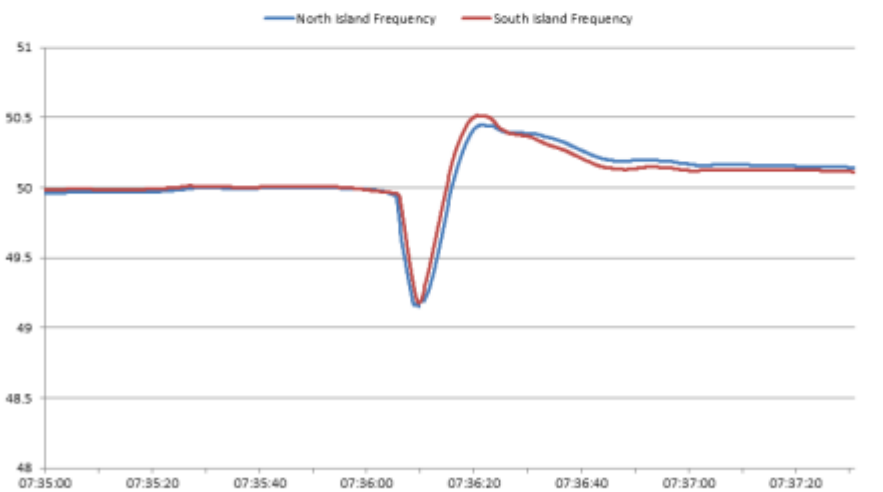
Revision of:

#### Under-Frequency Event Confirmation

The system operator wishes to advise market participants of the under-frequency event which occurred in both the North and South Islands on 02 May 2021.

<b>Event ID</b>	4175
<b>Affected Islands:</b>	North Island and South Island
<b>North Island Minimum Frequency:</b>	49.15 Hz
<b>Time (start of UFE):</b>	07:36:08
<b>Time (of min. frequency):</b>	07:36:09
<b>South Island Minimum Frequency:</b>	49.18 Hz
<b>Time (start of UFE):</b>	07:36:09
<b>Time (of min. frequency):</b>	07:36:09

Island Frequency - 02 May 2021



Market Operations

## 1.2 SYSTEM OPERATOR REQUEST FOR INFORMATION - GENESIS



Waikoukou  
22 Boulcott Street  
PO Box 1021, Wellington  
New Zealand  
Telephone +64-4-590 7000  
Facsimile: +64-4-495 7100  
[richard.renouf@transpower.co.nz](mailto:richard.renouf@transpower.co.nz)

11

24 May 2021

Steve Leppien  
Genesis Energy  
Private Bag 3131  
Hamilton

Dear Steve,

### 2 May 2021 North Island Under-Frequency Event

At 07:36 on 2 May 2021 an under-frequency event occurred in the North Island. We are investigating the event and require the following information from you:

- Could you provide information regarding the event and what you believe may have caused the under-frequency to occur on 2 May 2021.
- We have assessed the MW lost during the event as 291.72 MW at Huntly. Can you please confirm this assessment or provide data that indicates a different value of MW lost. We rely on SCADA data, but your data from site may be more accurate.
- Could you also confirm whether or not you could have been the causer of the under-frequency event as per the Code.

The information you provide will be used by the system operator to recommend to the Electricity Authority who the causer of the event was. The Electricity Authority will make the final determination of causer.

Please contact me if you require any further information.

Yours sincerely,

A handwritten signature in blue ink, appearing to read "R Renouf".

**Richard Renouf**  
SO Compliance & Impartiality Manager

## 1.3 SYSTEM OPERATOR REQUEST FROM INFORMATION – GRID OWNER



Waikoukou  
22 Boulcott Street  
PO Box 1021, Wellington  
New Zealand  
Telephone +64-4-590 7000  
Facsimile: +64-4-495 7100  
[richard.renouf@transpower.co.nz](mailto:richard.renouf@transpower.co.nz)

12

24 May 2021

Mao Reyes  
Compliance Manager  
Grid Owner  
Transpower  
Wellington

Dear Mao,

**2 May 2021 North Island Under-Frequency Event**

At 07:36 on 2 May 2021 an under-frequency event occurred in the North Island. We are investigating the event and require the following information from you:

- Could you provide information regarding the event and what you believe may have caused the under-frequency to occur on 2 May 2021.
- Could you also confirm whether or not you could have been the causer of the under-frequency event as per the Code.

The information you provide will be used by the system operator to recommend to the Electricity Authority who the causer of the event was. The Electricity Authority will make the final determination of causer.

Please contact me if you require any further information.

Yours sincerely,

A handwritten signature in blue ink, appearing to read "RR" or "Richard Renouf".

**Richard Renouf**  
SO Compliance & Impartiality Manager

## 1.4 GENESIS ENERGY RESPONSE



Genesis Energy Limited  
The Genesis Energy Building  
94 Bryce Street  
Private Bag 3131  
Hamilton 3204  
New Zealand

T. 07 982 7909

13

28 May 2021

Richard Renouf  
SO Compliance and Impartiality Manager  
Transpower New Zealand Limited  
P O Box 1021  
WELLINGTON 6140

By email: [Richard.Renouf@transpower.co.nz](mailto:Richard.Renouf@transpower.co.nz)

Dear Richard,

**RE: 02 May 2021 North Island Under-Frequency Event**

I refer your letter dated 24 May 2021 requesting information from Genesis Energy to help identify the causer of the 02 May 2021 North Island under-frequency event.

**Information regarding the event**

Huntly Unit 5 tripped on a combustor bypass valve deviation. Following the trip, the issue was identified, repaired and is fully resolved.

**Loss of Injection Figure:**

Genesis has assessed the MW lost during the event as 271MW using the methodology defined in Section 4.2 of the Transpower PR-RR-017 Providing Under Frequency Event Causer Recommendations procedure. The data supporting this assessment is attached.

**Causer:**

Genesis Energy considers it (Huntly Unit 5) was the causer of the 02 May 2021 North Island under-frequency event.

Yours faithfully  
**GENESIS ENERGY LIMITED**

A handwritten signature in black ink, appearing to read "Steve Leppien".

Steve Leppien  
Regulatory and Quality Assurance Manager

## 1.5 GRID OWNER RESPONSE



Waikoukou  
22 Boulcott Street  
PO Box 1021  
Wellington 6140  
New Zealand  
P 64 4 590 7000  
F 64 4 590 6968  
[www.transpower.co.nz](http://www.transpower.co.nz)

14

26 May 2021

Richard Renouf  
Compliance and Impartiality Manager  
System Operations  
Transpower  
Wellington

Dear Richard

**02 May 2021 North Island Under-Frequency Event**

Thank you for your letter on 24 May 2021 regarding the under-frequency event that occurred on 02 May 2021. My understanding of the event is as follows:

- At 07:36 on 02 May 2021 Huntly unit 5 tripped, resulting in an under-frequency event occurring in the North and South Islands.
- Market participants were notified by a frequency excursion notice issued at 07:55 on 02 May, that Huntly generation had tripped and that the North and South Islands' frequency had fallen to 49.15Hz and 49.18Hz, respectively.
- A customer advice notice issued at 15:33 on 04 May confirmed that an under-frequency event occurred in the North and South Islands at 07:36 on 02 May 2021.
- There were no protection operations of any grid assets in the vicinity of Huntly either before or after Huntly unit 5 tripped that may have contributed to the frequency falling below 49.25Hz.
- PI data shows that the HVDC temporarily increased transfer to support the North Island AC system after Huntly unit 5 tripped.

Considering the above information, I do not believe that the Grid Owner was the causer of the under-frequency event that occurred on this day.

Yours sincerely

**Mao Reyes**  
Grid Compliance Manger

## Appendix 2: CHARTS

### System Frequency and MW Trace 2 May 2021

Loss of HLY 5 Generation on 02 May 2021

